IMPLEMENTING INFORMATION SYSTEMS/OFFICE

AUTOMATION IN AN AIR FORCE ENVIRONMENT

THESIS

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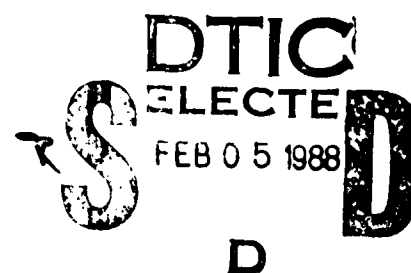
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AN AIR FORCE ENVIRONMENT

THESIS

Presented to the Faculty of the School of Systems and
Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Information Systems Resource Management

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December 1987

Preface

The purpose of this study was to identify and confirm the existence of specific factors that are influential in determining a successful information system/office automation implementation, specifically for the purpose of applying these factors in the Air Force environment, to increase the benefit of information systems to the USAF.

In performing this research I have received help from several people. First I wish to extend thanks to the NCR corporation, in particular Mr Mike Wine, who made his managers and staff avialable to me. Next, I wish to extend thanks to the B-1B SPO, especially Lt. Mike Winslow for his help in interviewing that organization. Individuals in both organizations were free in their opinions, which I believe increased substantially the richness of the research. Finally, I am indebted to my thesis advisor, Lt. Col. Peschke for his advice, support and for helping me develop the original concept that became this thesis.

<div align="right">WILBURN SMITH</div>

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Abstract

The objective of this research was to identify, through case study and literature review, guidelines that have been developed and successfully demonstrated in civilian and/or government organizations, through which a foundation can be laid to effectively implement information systems in an Air Force office environment. In particular, how well do these guidelines apply to the office automation efforts of one existing office in the B-1B System Program Office (SPO)?

To accomplish this research, interviews were conducted at the National Cash Register Corporation and the B-1B SPO then grouped by the degree of consensus obtainable. Specifically, the opinions expressed were classified as majority or minority opinions. Next, this study compared the opinions expressed to determine what differences existed between the two implementations and how these differences accounted for their relative degree of success.

Based on the comparison of the two implementations there were five findings that were determined to be consistent in identifying a successful implementation and could be used to develop effective policies and guidelines. The five findings to the research were: 1) a set of well-defined goals and organizationally accepted success criteria are consistent with successful IS/OA implementation; 2) a highly visible top management is a strong ingredient in a successful IS/OA implementation; 3) the research supports

the necessity of establishing a well-regulated and
publicized planning process; 4) there appears to be little
difference between the commercial implementation and the
government implementation; 5) the consideration of user
needs and satisfaction acts as a synergistic value to a
successful IS/OA effort.

This study achieved three important goals. First, the
research provides the basic framework necessary to begin the
development of a coherent policy for future IS/OA implemen-
tations. Second, the information reinforced the need to
establish an orderly process by which the success of an
IS/OA can be determined. Finally, the study has shown that
there are tools and methodologies available that can be used
to help determine how to implement an IS/OA to benefit the
Air Force.

IMPLEMENTING INFORMATION SYSTEMS/OFFICE AUTOMATION
IN AN AIR FORCE ENVIRONMENT

I. Introduction

Background

In 1987 the B-1B System Program Office (SPO) reported that the current means of tracking deficiencies for corrective action was inadequate to meet the SPO's engineering and development mission. The problem revolved around the fact that the data storage and retrieval process used for suspense tracking and information management was cumbersome. In fact, a single inquiry required the use of three separate databases to manually obtain often vital program management information. The difficulty was traced and could be broken into three component problems. The first was the lack of a common database. Thus requiring use of manual data handling to cross reference information. Second, most data was stored in computerized databases using different software in different hardware, preventing the timely electronic transfer of data. Third, the responsibility for tracking suspenses was not readily identifiable.

The SPO currently tracks deficiencies and suspenses through three non-relational databases. The first database contains the Material Improvement Projects (MIPs) information, which are deficiencies identified by operational

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evaluators. The second database contains the Notices of Deficiency (NOD), which are issued to a contractor to notify them of a deficiency with a suspense for action. The final database contains the Engineering Change Proposals. The ECPs specify the actions necessary to correct a deficiency, which is approved by the SPO director. Simply, the SPO must be able to cross reference the MIP/NOD/ECP information to determine if a deficiency has been identified, the contractor notified, and corrective actions taken. Yet, since all the deficiencies and suspenses are tracked in uncommon databases, this process requires manual intervention; increasing system inefficiency. Ultimately, the ECPs are delayed in their approval/acceptance, meaning a deficiency is not acted on in a timely manner. The significance of this fact, is that the modern databases and information systems that would allow the SPO to coalesce and manipulate this data are unused. Most importantly, this area is crucial to the B-1B development effort as it serves as the vital information conduit for the Air Force to identify and correct problems on the B-1B (2).

Statement of the Problem

The objective of this research is to identify (through case study and literature review) guidelines that have been developed and successfully demonstrated in a civilian organization, through which a foundation can be laid to

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effectively implement information systems in an Air Force office environment. In particular, as an example, how well do the guidelines that are used for office automation at National Cash Register (NCR) apply to the office automation efforts of one existing office in the B-1B SPO (case study example)?

Research Questions

To solve this problem, the following questions need to be answered:

1) What defines a successful implementation of office information systems?

2) What management actions were taken to implement a successful information system in an office?

3) *How was the information system planning conducted?*

4) What were the problems associated with implementation and how were they overcome?

5) How were user needs and human factors considered?

6) What should have been done differently?

7) Which of these indicators, guidelines or components are transferable to the Air Force environment (10) (29) (18)?

Scope of the Study

This study does not address the applicability of information systems above the office level environment nor does it evaluate the validity of the management concepts in

the organization. Also, this study does not use objective

measures that can be statistically proven nor does it

analyze the quality of previous data reported in the

literature review.

This study does identify variables that have proven

useful in a consensus of the literature and through first

hand case study. Through the literature and case study this

research addresses the applicability of the implementation

concepts to the Air Force environment in general and one

organization in particular and in addition, identifies areas

for further research.

Limitations

Several limitations inherent in this study should be

considered when evaluating the results and conclusions.

First, the findings concerning the value of information

systems to the organization and their success factors are

subjective. Second, the variables found by case study will

have no statistical validity since, the sample size is too

small. Finally, the degree of applicability of the

information system implementation efforts of the private

sector to the public sector is subjective and will be

actually applied in only one case.

Assumptions

Several major assumptions have been made in this study

concerning the applicability of information systems concepts

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to the Air Force. First that the MIS concepts can be applied to the public sector. Second that even though there is no empirical evidence relating to the variables to be explored, the consensus opinion is assumed to be valid. Next, the B-1B SPO office is assumed to be typical in terms of available resources, personnel, policies, and practices. Finally, this study assumes that those elements from the private sector (specifically the NCR corporation), not restricted by Air Force or DOD regulations, are indeed transferable to the Air Force working environment.

Definition of Terms

The following terms, used frequently throughout this study, are defined as follows:

Management Information Systems (MIS). This term refers to the "wide variety of computer resources" that "provide processing for a formal information and reporting system", and are used "to accomplish managerial decision support" responsibilities (9:4).

Information Systems/Office Automation (IS/OA). A class of information systems that refers to electronic office equipment, "which provides integrated, multifunctioned, automated office support". This particular aspect of information systems is primarily concerned with the automation of documentation processes and "electonic communications" (47:388).

User. The term user is often dependent on the context in which it is used. In this study all personnel for whom the information system is destined are considered a user. Dependent on the context of the discussion both office workers and managers can be considered users.

Implementation. Implementation is the process of preparing the organization for a new system or change and then introducing it into the organization by whatever means are necessary (9:593).

Strategy. The term strategy refers to the approaches that are taken to assist or guide implementation efforts. Most often it incorporates, the body of goals, policies, or plans an organization uses to meet its objectives.

II. Literature Review

Overview

The purpose of this section is to review the literature applicable to this research on the subject of information systems/office automation (IS/OA) and its implementation. This section reviews previous research which attempts to establish the value of an IS/OA to the organization and the implementation factors that are associated with successful implementation efforts. Also covered are opinions on what are the necessary strategies and components considered vital to the success of an IS/OA effort. The literature also covers the importance of the implementation process and the role management needs to play in the overall scheme. Finally the effects and importance of the user and the consideration of human factors are discussed as well as the potential for transferability of MIS concepts for IS/OA to the public sector.

General Review

The review of literature yielded numerous variables considered to be important to IS/OA implementation. However, there has been no empirical proof to date as to which ones are directly responsible for success or failure, nor which are more valuable than the others. The Rand corporation performed a comprehensive survey of literature

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in 1981 and identified the most often discussed variables of the IS/OA field, particularly those variables most often used for implementation. The areas the study singled out as important were organizational context(environment), management, rationale, planning, user participation/human factors, and post adoption implementation (resistance to change)(5:13). However, the study also mentioned that there is no one prescription on how to apply these factors, or what methods can best be used. As will be shown later in the literature review, there is as great a division among the authors as to what is important for implementation. In 1983 Henry Lucas concluded that more research was needed (29:4). Within the context of the research questions stated in Section One, this section explores further, the rationale for many of the variables and the concepts that unify them.

Value of Information Systems

The value of the IS/OA to an organization has been found to be largely subjective. The literature in this section, specifically articles by authors Charles Galagher, Henry Lucas, and John Abeth, has found that the value of an IS/OA is hard to define (15)(28)(1). In essence, the measure of the value or the degree of contribution an IS/OA makes to an organization can not be identified with one single output of any organization. However, the consensus is that IS/OA do contribute to the organization.

In 1974 Galagher measured the perceived values of IS/OA as viewed by management through empirical study, and determined that a value for an IS/OA could not be found. However, the perceived value expressed was positive in almost all cases. Thus, though the measure of value was highly subjective, the perception was consistent throughout the organization that the IS/OA contributed to the organization as a whole (15:2). In addition Galagher was able to focus on the essential areas within the organization that affected the perceptions held about the IS/OA. They were found to be the size of the organization, the budget allocated to the system, the amount of user participation, and the relationship of perceived value to the managerial position (15). Following essentially the same logic Lucas, in 1975, also found the value of IS to be in the perceptions of the users, specifically, their perception of improved performance (28:918). Lucas also found that the perceived value was not without some validity, specifically he determined that the overall productivity goes up when an IS/OA is introduced into an office (28:908). Concurring with Lucas, Abeth in 1986, found the value of an IS/OA to be in the form of intangible benefits (1:56). These benefits included the overall increase in departmental productivity after implementation without an increase in staff, an increased ability to meet deadlines, and improved effeciency through automated systems (1:57).

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Successful Implementation Factors

The successful implementation of IS/OA has been a prime area of debate and research in the MIS field. This particular area of research is considered by many of the authors as critical, since the value of an information system can only be realized if the implementation is successful (11)(16)(12)(18)(5). However, there appears to be very little empirical evidence that can support any one factor as being the main determinant. Most management texts tend to accept a contingency approach or philosophy in the establishment of any organizational change or transition (34)(35)(45)(20). Yet, in most contingency approaches little is known as to what extent the various factors that are key to success need to be applied. In essence, this area of doubt in the contingency approach is still under examination (35). The literature did provide several authors who had done work in examining successful and unsuccessful IS/OA. Though not in complete agreement there was some consensus. Essentially, the authors (Bert Debrabander, Anders Edstrom, Michael Ginzberg, G. Theirs, and Gamini Gunawardane) all consistently found the user to be the key player in any successful IS/OA. Additionally, they found planning, particularly for user involvement, to be important (11)(16)(12)(18).

In 1977 Debrabander and Edstrom identified user involvement as the single constant of successful information systems projects (11:191). Their research focused on the communicative patterns, organizational context factors, and user behavior in relation to professional designers and operators. The essential point they found is the user and specialist had different perceptions as to the design and degree of simplicity required in an IS/OA (11:198). This is important because the specialist tends to build a system suited to his/her ability and often forgets the user (11:191). Thus success or failure is dependent on how well the specialist can think like the user. Since this is not a likely occurrence, the ultimate finding is that "user involvement seems to be the only one which is consistently and significantly related to quality of final outcomes" (11:191).

In 1978, Ginzberg, using past records of the difficulties encountered in implementation failures, found few corporate guidelines that could have aided in success. However, he did find the effects of organizational change tended to do better if planned, and that the patterns of behavior of management as well as those of the users and designers were directly tied to success or failure (ie..the degree of cooperation). Specifically he found that designers who did not address the needs of their intended users were most often unsuccessful. In essence, the

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successful IS/OA always required the commitment of all parties especially the user (16:45). Next, Debrabander and Thiers, in 1984, expanded on Debrabander and Edstrom, and Ginzberg and explored "under what circumstances the interaction between users and specialists lead to success" (12:137). They found the users who are subordinate to the specialist are less inclined to work well. This also leads to inefficient task accomplishment (12:137). Thus their research indicates an effective IS/OA is as dependent on the consideration of the user's behavioral needs (ie...esteem) as it is on his/her processing needs. This is of great importance in that the implications for system development, IS/OA implementation, and interaction tends to indicate a behavioral science approach to IS/OA. Other components that they found to be important but not strongly related were that the success criterion need to reflect the degree of goal attainment and that the greater the involvement of management the greater the tendency for the organization to be successful (12:137-138). In addition, they found the best motivators for the user and management were feedback and reward incentives (12:144).

In 1985 Gunawardane used the case study method to try to find underlying factors that could be identified from an actual implementation. The main result he found was that most, if not all the primary problems of the IS/OA were due

to the user. From the user problems he was able to determine the ones that were considered most damaging. They include:

1) A failure to clearly establish the needs of the users (18:97).

2) A failure to chose the system suited to the management style of the company (18:97).

3) A lack of emphasis on documentation, user education, and training (18:97).

4) "Poor handling of system conversion and implementation" (18:98).

5) A "failure to recognize human factors" and no consideration given to possible user resistance or political conflicts (18:98).

The end result of the TAVA corporation implementation case study is that, dependent on the organizational context, the user was clearly the most significant factor in determining success or failure. Therefore Gunawardane recommends that to ensure a successful IS the implementation plan needs to be a user oriented approach (18).

The variables presented thus far are only a sample of the most consistently mentioned variables. Other variables also found were the need for common perceptions about the purpose of the IS, and the ability of the organization to accept changes.

Strategies/Methodologies/Planning

The importance of strategy and planning for an organizational change has been well established by the Organizational Development School of Management and the MIS academic community (7)(34)(35)(52). However, in the literature on IS/OA, there is no consensus on the point as to which strategy leads to a successful IS/OA nor a consensus as to which determinants are effective in planning. Several authors (Anthony Gorry, Michael Morton, Richard Boland, Richard Nolan, James Wetherbe, A. Montazemi and D. W. Conrath) believe this is done by a framework whereas others (Henry Lucas and Manfred Kochen) believe that frameworks are failures (17)(6)(33)(32)(29)(26). All these ideas are in contrast to those of Richard Schonberger who believes that IS/OA should be made to adhere to a greater strategy and not pursue or be part of an independent one, in as much Peter Keen believes the strategy should be political (44)(24).

In 1971 Gory and Morton attempted to determine if a framework would be of benefit to the organization in establishing an IS/OA. Essentially, they reasoned that a framework would allow for viewing the organization as a whole and aid in effective planning so it would be possible to make sensible allocations and determine system tasks, thus "providing focus and improving effectiveness" (17:55). The chief benefit of a framework would be to understand the

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human decision making process which if possible would then allow the understanding of the human information needs. Thus to improve the quality of decisions, the quality of information to the manager must first be improved and to do this the information must meet the users needs (17).

In 1978 Boland reviewed the development of system and design requirements to determine how the users and managers should be involved in the strategic process and the implications their involvement would have for the organizational structure. He determined that a contingency framework was indeed needed as a means to take into account the different problems that required different organizational structures (6). Nolan and Wetherbe essentially answered Boland by developing a comprehensive framework that attempted to define "the domain of the MIS" (33:1). Their framework incorporated the various organizational concepts and social theory. The framework encompassed the features of MIS such as database technology, human information processing, programming and system design. In essence, their framework envisioned the interplay of the subsystems of an organization. Essentially the subsystems are goals and values, tasks, technology, structure, management, individual behavior, motivations, roles, and relationships (33:8).

Schonberger in 1981 disagreed that the IS/OA strategy had to be based on a contingency framework. He determined that organizational structure tends to follow the strategy

laid down for it. According to Schonberger, findings tended to "show that IS departments should be structured to suit corporate strategies rather than to fit an idealized model" (44:71). Essentially Schonberger explains that a strong competitive corporate strategy should cause the IS of the organization to become effective, flexible, and user oriented.

In 1981 Keen advanced the position that the IS/OA strategy should be based on political and social factors. Keen determined that an IS/OA is a political system, and as such the organization is driven by social inertia. Essentially, he believes the pluralistic nature of the organization requires careful attention to the political aspects (24:24).

Lucas in 1983 found the IS/OA in most organizations is poorly understood and whatever effectiveness exists is dependent on managerial action in providing user support such as seminars, publications, and teaching programs (29:11). He determined through review of literature that because of the failure of frameworks, the natural strategy to pursue is the multidisciplinary approach (29:2). Lucas was also able to obtain a consensus of opinion from his collegues at the Center for Research on Information Systems that the greatest need for implementation research is to find which strategies would lead to success. To find an effective strategy Lucas recommended testing a specific

setting (29:8). Through this process managers can come to understand how to make users fully understand the capability of the IS/OA (29:9).

In 1986 Mary Sumner took a different approach and asked management as to their approaches and strategies for IS/OA implementation. In a survey of managers it was found that they tended to chose information systems that provided for control rather than meet user needs. Thus the predominant strategy indicated was organizational efficiency (49:206).

In 1986 Kochen expoused the view that belief in frameworks is wrong. He believes that management should wait for the "theoretical experimental study first" (26:92) then design, as opposed to designing frameworks then experimenting. His rationale is that "frameworks were developed to organize research" (26:92),and have not performed well at all. Essentially, Kochen found that frameworks have yielded no results or proposals that have to date solved IS/OA problems (26:92). Thus more studies must be made before valid frameworks can be made, and this may not be possible because the MIS field is not yet mature enough to support the framework. However, in 1986 Montazemi and Conrath determined that a framework was needed to model the cognitive aspect of the IS/OA process. Specifically, the cognitive aspect recognizes the cause and effect relationships and as such can provide a map to show the

organization the value of a particular strategy or decision to the organization. As a first step to this strategy, they recommend the manager first deve_op goals based on critical success factor analysis, and then use the cognitive approach to select the correct strategy (32).

Management

The role of management has been found to be an important driver in IS/OA success, specifically, the manager has a preeminent role to play in determining whether or not the vital organizational issues are addressed in the requirements, design and implementation process. Because of this special role his/her influence is especially important, not only as a supporter of the system but as a change agent as well. Authors Burton Swanson, John Rockart, and Adam Crescenzi are all in agreement that the involvement of top management in all phases of the IS/OA is critical to the success of a system (51)(39)(40).

In 1974 Swanson determined that the failures of IS/OA have consistently been the result of a lack of managerial involvement. He found that typically managers who are involved in all phases of the IS/OA appreciated the system more. In addition, it is clear that the amount of user involvement is essential to the success of any IS/OA effort, but that involvement is to often unclear and therefore needs the rigorous involvement of management for direction (51:178). In an annotated bibliography on this article by

Jim Hutchinson, he suggested that failures were mostly due to designers not letting the managers know how the system works (21:1). In 1979, Rockart carried this idea even further and advanced the premise that managers need to identify critical success factors, which is essentially a process that requires the involvement of top management to determine the needs of the organization. Rockart recommended that management select CSF based on the limited areas whose positive results will spell success for the organization, specifically, there area of IS/OA (39:85). But just as important as identifing the critical success factors is the willingness of management to work those issues agressively (39:86).

In 1984 Rockart and Crescenzi expanded the CSF theme even further. In essence they stated that for IS to be successful top management must "get off the sidelines" (40:3). Specifically, they expressed the belief that the IS of the organization is a strategic resource and therefore must be planned for at the top level of management (40:3). They expressed the belief that only the first-hand involvement of management could result in an IS/OA that more completely conforms to the strategy of the organization. Hence the way to accomplish this is through the analysis of those factors that are most critical to the function of the business, and from there determine the role of the IS/OA, specifically through the identification of CSF (40:4).

User/Human Factors/Attitudes

The consensus of almost all the literature surveyed to this point has reaffirmed the need to consider the user and human factors in the context of their critical importance to success. Essentially it appears evident that the importance of considering user requirements is all pervasive, or rather is an important component to most if not all management activities. In this light, it can be determined that the knowledge of whether or not, providing systems that take into account the human factors and create favorable attitudes would indeed be valuable. On this point, there is debate, simply because there is no consensus nor any proof that user attitudes improve performance or that providing systems based on human factors leads to success (45)(20).

In 1976 Charles Schewe surveyed 10 food processing firms management and staff. He found that "computer based information systems fall short of their theoretical capabilities" (43:577). Important in his findings was the fact that the psychological and behavioral aspects of the user were an unknown. Schewe also found there to be little correlation between the usage of a system and the attitudes of the user. He assumes that since the attitudes of the user are not an impediment, the problem is than one of ability, which really translates into a need for training and education (43:577). In essence, no matter how good the IS/OA or technically competent the designer, the system can

not succeed if the user is not capable (43:589). However,
Schewe's position is strongly challenged by Daniel Robey
(38). Robey believes that "specific attitudes are
positively related to the use" of an MIS (38:527).
Specifically Robey points out that "MIS can and does fail
where user psychological reactions and organizational
factors are ignored by the system designers" (38:527). The
pressing need is for designers to create "favorable user
attitudes" (38:527). In addition, Robey believes that the
way to achieve the improvements, is through incentives
because, "unless rewards are contingent upon performance,
use of a system will not increase" (38:535). Robert Zmud
concurs with Robey and finds that IS/OA success is
determined to a great extent by individual differences (58).
His studies indicate that user involvement is positively
associated with MIS success and that "MIS user attitudes are
associated with MIS usage while MIS-user involvement is
associated with satisfaction" (58:974). However, this
occurs only in the context of a given situation and
environment. Zmud also found that,

> the strongest associations are characteristics
> related to individual perception and the structure
> of environmental stimuli must sustain the
> individuals view of the organization or will
> result in resistance to the change (58:974).

In essence, this means that unless the user sees the system
as a logical and reasonable part of his/her work or as
providing a valued output then it will not be accepted.

The 1984 article of Anne Paxton and Edward Turner essentially agree with Schewe. They put forward the idea that since most workers are not professional computer operators, human factors application has an important role to play in the design of the IS/OA systems. They propose that there is a higher degree of acceptance of computers that provide the user with feedback (36:137). In addition they indicate that it has been shown there is improved user attention and retention with computer systems that tutor the user. The main point made by Paxton and Turner is that the consideration of human factors in the IS/OA plan and design is critical because if done properly the potential gain to the organization from the non-professional computer operator is enormous (36:155).

Using a different approach Blake Ives and Margrethe Olson tried to find guides on how to determine how much user involvement is needed to be effective in influencing success. The best guides that they found were intuition, experience and prescriptions. In essence, they expressed that the common wisdom dictated that as user involvement increases the chance for success in IS/OA implementation increases as well (23:587). Simply put the influence of user involvement on successful implementation has been strongly demonstrated and as such it is based on a strong consensus, hence they chose not to question the relevance of attitudes but instead accept the lesson of experience.

Pursuing the issue of attitudes, in 1985 the Journal of

Systems Management performed a survey of attitudes among

knowledge workers in IS/OA towards IS/OA. The large

majority indicated that it made them more productive.

Nearly all found the work enjoyable and perceived there to

be many benefits. Almost all considered themselves as being

more creative, and thought the skills improved their career

advancement. The majority felt it created more jobs as well

as helping the organization. But most important they

considered it a standard asset of the office. In terms of

the system being used they found that the IS was used

frequently, used for work, often saved time, and was not

difficult to be taught and many thought it made for easier

coordination within the organization (25:40-41).

Organizational Context

The final area is that of transferability. Most of

the literature agrees that implementation is dependent on

the organizational context and the organizational structure

but most importantly the environment. The important fact

here is that there is doubt that MIS concepts practiced in

the private sector (at whom most of these article are

directed) can be used or transferred into the government

sector. Essentially, the literature is split, Phillip

Ein-Dor and Eli Segev tend to support the concept that the

organizational components that affect an IS/OA

implementation are inherent in the structure and thus can be

applied anywhere (13)(14). Whereas authors Tora Bikson,
Barbara Gutek, Don Mankin, Peter Ring and James Perry tend
to support the idea that the variables in the federal
government are uncontrollable (5)(37). In 1978 Ein-Dor and
Segev identified the organizational contexts that lead to
MIS successes and failures. The variables they found most
commonly associated with success and failure were
organizational size, structure, timeframe, resources,
maturity, psychology and the responsiveness of top
management (13:1067). In essence the findings were as
follows:

1) The lower the rank of the manager in charge of
   the MIS the lower the likelihood of success.

2) "Smaller organizations are more prone to MIS
   failures because of time and money problems"
   (13:1071).

3) "The more plentiful the supply of requisite
   resources in the external environment the
   greater the likelihood of success" (13:1071).

4) The smaller the organization the less likely
   the IS/OA effort is going to be successful.

5) "Expectations and perceptions play a
   predominant role in establishing the
   psychological climate in an organization" and
   is reported important in every successful MIS
   (13:1071).

However, Bikson, Gutek, and Mankin in 1981 considered a

different perspective, in fact they stated:

> literature yields several reasons for
> thinking that the federal government will
> fare poorly as an instrument of organizational
> change. First Federal official have limited
> knowledge of what incentives will be
> effective in a local context. Second, the
> federal government has few incentives to
> offer a situation not likely to improve.
> Finally, federal incentives have not operated
> well in this arena (5:32).

Essentially, the Rand study considered the public sector

handicapped in its ability to implementing modern management

concepts such as MIS.

A study by Ein-Dor and Segev, in 1982, found "no one

way to structure a successful MIS" (14:66). The success of

an MIS is dependent on the ability to fit to the particular

environment (ie..organizational size, structure, and MIS

structure). Thus there is no such thing as an ideal

environment for MIS as far as structure is concerned. This

would tend to indicate that the government is a suitable

candidate. Yet in contrast Ring and Perry in 1985 contend

that private sector planning techniques and policies are not

possible to transfer to the public sector because the

environment the government works in is not usable due its to

inherent failings such as organic laws, politics, public

expectancy, openness to the public criticism, budget

problems, time constraints and uncertain conditions that

prevent such things as incentive programs or rapid

turnarounds (37).

Summary

In this chapter, a cross-section of research literature was examined to find what were the factors most commonly associated with an IS/OA implementation. The literature identified five factors that play a role in all implementations. Unfortunately there was little or no consensus as to the overall value any particular factor contributed to an implementation. In brief, the findings of the literature are as follows:

1) The value of an IS/OA to an organization is subjective and largely based on perceptions of the users, and nearly impossible to measure.

2) There is little or no empirical data that can support any specific factor as being a determinant of success, only patterns or tendencies.

3) Though planning was deemed important, there was no consensus as to what strategy or determinants would be effective in planning an implementation. Simply, there are neither guidelines nor polices that are known to be readily effective.

4) The consensus of the authors surveyed found that the support of top management was necessary for a successful implementation, but there was no consensus on how top management should provide support. However, involvement in all phases was recommended.

5) There was no consensus or empirical proof to
   indicate that providing systems based on human
   factors leads to success. Since there is no
   evidence that improved user attitudes or job
   satisfaction leads to improved performance.

In all, there was only one aspect of common agreement;
the recommended need for more research and first hand
observations in a specific setting. In essence, the actual
study of IS/OA by case study. This fact combined with the
real need of organizations such as the B-1B SPO, involved in
an IS/OA effort is the foundation for the methodology in
Chapter III.

III. <u>Research Methodology</u>

<u>Overview</u>

The result of the literature review has indicated that the success of an IS/OA implementation is a perceived measure (15) (28) (1). Also, there is little consensus on how to apply the factors of management, planning, or user needs/human factors considerations when implementing IS/OA in an office environment. In fact, according to authors Sprague and McNurlin, "the history of office automation has more stories of unsuccessful than successful projects" (47:388). Part of this problem is due to the short history of IS/OA which, when combined with the advent of modern affordable office computers, limits the research that is available in this area (47:388-418). To alleviate this lack of information the methodology supported by the Chapter II research is the case study (44) (29) (18) (5) (9) (47). Thus the case study approach is the foundation for this chapter.

<u>Method</u>

The method used to solve the research problem and answer the investigative questions is basically comprised of four phases. Each phase serves to affirm or eliminate elements of information system implementation present in

each preceding phase. The end result is a set of policies, approaches and strategies that are generally applicable across the civilian/government arena and can be used as guidelines for information system implementation, specifically office automation in the Air Force.

Phase one consisted of a literature review to identify successful information system implementation strategies and those factors considered vital to successful office automation.

Phase two was a case study of a successful information system implementation. This entailed interviews with the management and workers in an organization which has obtained positive results from an information system/office automation implementation. The end goal was to identify those attributes that caused/aided the success of that organization's effort. Specifically, the NCR corporation was selected as the case study example. NCR is a good case example for four reasons. First, they are a multi-billion dollar corporation whose primary business is office and workplace information systems. Second, NCR has an extensive consulting branch that deals with implementation issues. Third, NCR's main headquarters is in the local area. Finally, the NCR implementation has been successful (56).

Phase three was a case study of an Air Force office, in the B-1B SPO.

Phase four was a comparison of the research question responses to determine which strategies and procedures identified in phases one-three may be used in the B-1B SPO.

The end result of this research is a logical set of guidelines that can be used as a starting point for a framework for planning an information system implementation activity and more indepth research. The particular method involving literature review and case study was as previously mentioned, recommended by the literature, specifically by Lucas (29:8) and research done at the Center for Research for Information Systems.

Specific Method: The Collection and Presentation of Interview Material

The interview responses from phases two and three are grouped into majority and minority responses. This is done for three reasons. First, the unstructured nature of the responses means there are few "yes/no type" answers, thus to make the replies presentable they are grouped around common themes. Second, grouping the answers will identify which components or elements of an implementation are most and least perceived as important to the success of the respective implementations. Finally, majority/minority groupings will facilitate the comparison of responses between case studies.

IV. Findings and Analysis

Overview

The purpose of this chapter is to compare two realtime information systems/office automation implementation activities. Specifically, the activities of the NCR corporation during an ongoing information systems implementation effort is compared to an information systems effort at the B-1B SPO which, as indicated in the Background of Chapter I, has been perceived as not being as successful as necessary to effectively accomplish its required mission. The impetus of this chapter is to examine the efforts, via informal interview, at NCR and the B-1B SPO, as to what implementation policies or procedures were most prevalent in their respective IS/OA. The results of these interviews are then compared to determine what differences or similarities exist.

Background on NCR IS/OA Implementation Effort

In 1985 NCR developed a task force to analyze how to make the NCR sales department more productive. Upon receiving their analysis the NCR Vice President of the United States Data Processing Group began a two year program to modernize the NCR IS/OA. This modernization program consisted of three phases. In phase one a pilot site was set up for the prototyping and development of concepts.

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Phase two was an application and analysis phase utilizing generic hardware and prototype software implemented into a limited work environment. Finally, in phase three the computer system was implemented into the entire office environment. Currently (as of May 1987), the NCR corporation has entered Phase three (56).

The NCR IS/OA Implementation

The NCR IS/OA information was from nine employees of the NCR corporation using the informal interview technique. The personnel were selected at random, from the same office location (Dayton, Ohio) within the same building and office setting. The employee's experience with the corporation ranged from 1 to 30 years. The jobs held by the interviewees covered the levels of management from a basic job processor to a senior district manager. The scope of the interviews included two NCR departments; Administrative Services and Business Systems. The Administrative Services department is the primary implementor of the information system effort and the Business Systems department is the primary user.

The personnel interviewed and their job descriptions are as follows:

Mike Wine   Senior District Manager

Don Carone   Executive Account Manager

Ed Weaver   District Manager

Judy Steele	Job Order Processor
John Mezinko	District Manager
Mike Smith	Account Manager
Jim Sampier	Associate District Manager
Dodie Royer	Associate District Manager
Diane Lorelle	Associate District Manager

The interviews were conducted on 22 May 1987, at the NCR district headquarters, Dayton Ohio.

Presentation of Interview Material

This section contains a compilation of responses to the interview questions outlined in Chapter I. The responses are grouped into majority and minority opinions in an effort to identify how important the research areas were in deterining the success of implementation. Though many responses contain elements often related to either group, descriptions and elaborations (given by the interviewees) were used to the greatest extent possible to faithfully classify the answer. Most important, it should be remembered that these responses are interpreted subjectively. A complete synopsis of the answers obtained by the informal interviews at NCR are in Appendix A.

Synopsis of NCR Interview Responses Group By Majority/ Minority Consensus

Measure of Successful Implementation. The interviewees were asked what they believed made an IS/OA implementation

successful. The respondents had a very narrow set of view points on this issue; indicating they share a common set of goals and perceived values about what comprises a successful system.

The Majority Opinion. Of the nine opinions expressed, seven were in agreement and comprised a clear majority. The respondents expressed the preference for the ability of the equipment to perform in a manner considered valuable to the person using it. Specifically, the interviewees measured the success of a system in terms of job performance, effectiveness, efficiency, speed, and productivity (56)(8)(54)(48)(46)(41)(27). In essence, the IS/OA must achieve the goals that are set for it.

The Minority Opinion. There were two Minority Opinions. The first opinion expressed the view that the measure of a system's success was if it was used (30). In the second minority opinion the respondent believed that a small number of complaints indicated a successful implementation. Thus, high system reliability was the measure of success (42).

Top Management Support. The interviewees were asked what support from top management they received. The respondents demonstrated a narrow breadth of views on this issue. Specifically, all the answers indicated the presence of top management support but in varying degrees of involvement.

The Majority Opinions. The majority opinion comprised four of the nine responses. The opinion expressed by these respondents indicated that they saw top management support in terms of top down direction, budget approval, delegated decision making, and the provision of tools to complete the work (56)(8)(48)(30). All were essentially unanimous in that the bureaucratic cycle as it is, would not provide such support unless it was desired by the corporate top management.

The Minority Opinions. There were three groupings of minority opinions. The first grouping indicated that the hands off approach backed by organizational expectation of success was the predominant form of top management support (46)(27). Specifically, there were no actions to either hinder or aid the implementation. The second grouping placed the emphasis on the willingness of middle management to accept the role of leadership as an indicator (42). In essence, when middle management began to take an active role it was assumed to be due to top management pressure. The third grouping indicated that the structural support of training and schedules was an important indicator of the corporate will. Specifically, the adherence to or enforcement of deadlines. In particular the upper management maintaining their schedules so the rest of the corporation could as well (54)(41).

Information System Planning. The interviewees were asked what information system planning had they been aware of or had personally seen. The views on this area ranged from a strongly indicated and deep involvement in planning to total uninvolvement.

The Majority Opinion. The majority opinion expressed, included six of the nine responses. The responses showed that there was a great awareness of planning activities and their importance. These efforts were evidenced by the interviewees knowledge (in various levels of detail) of the activities of consultants, the use of surveys, the participation in/or access to advisory councils, and involvement in planning sessions to ensure logistics and support items(56)(48)(46)(42)(41)(27).

The Minority Opinions. There were only two groupings of minority opinions. In the first grouping two of the personnel interviewed found no evidence at all of a planning effort, but instead a general acceptance that one had taken place (8)(54). In the second grouping, the planning issue was not even considered, since the effort is believed to be the responsibility of someone else (30).

Problems Encountered. The interviewees were asked as to what problems were encountered in the implementation. The respondents gave a wide range of opinions. This resulting in only minority opinions.

The Majority Opinion. In this area the respondents were unable to generate a majority consensus. The lack of a majority consensus would indicate that as a whole any commonly perceived needs of the group were met. This fact would account for the collection of only minority opinions which would most likely represent individual needs.

The Minority Opinions. There were four groupings of minority opinions for this area. In the first opinion, three of the interviewees indicated they knew of no problems (48)(30)(41). In the second opinion, the problems that were found were due to a lack of planning, no advanced knowledge of problems and too much being given to soon. However, these criticisms are qualified in that they could be overcome by manual efforts (8)(46)(54). The third opinion indicated that the problems were not perceived or considered as important once it was brought under the direct control of the respondent (27). The fourth opinion found the problem to be time lost in having to train personnel as well as the time lost in deciding on what hardware/software to get (56)(42). In a final point, opinions three and four share in common the point that they recognize a problem exists yet they do not agree on a specific problem.

User Needs/Human Factors. The interviewees were asked how were the user needs and human factors considered? The employees of NCR were nearly all unanimous in their answers,

however each qualified those answers which broadened the diversity of the responses and increased the number of groupings.

The Majority Opinion. The majority opinion was comprised by four of the nine responses. This majority response was that the rank and file were not consulted but the needs were considered by other organizational components because it was the responsibility of others. What is unique here is the faith demonstrated in the corporate process of methodically taking such questions into account. The personnel were all aware that consultants had been hired, that a pilot site was used, and a task force had been established. But more importantly they were aware of the implications of such actions (54)(48)(30)(46).

The Minority Opinions. The minority opinions can be placed in two groupings. The first minority opinion was that needs were considered in the form of massive training efforts, the purchase of user friendly software, rapid response to complaints, and surveys on the change progress (56)(41)(27). The second minority is diametrically opposed to the first. This individual did not believe needs were considered at all (8). The third and final minority view saw needs considered at the lower level. The response here was that the consideration of needs "varied from case to case, specifically the respondent found that where possible

the user was given a choice" (42). In particular, he had a
say so as to whether or not to attend training (42).

Lessons Learned. The interviewees were asked what they
would do or like to have seen done different. The answers
to this question tend to confirm the answers given
previously, in that the problems identified for correction
were essentially those that were mentioned as being averted.
There was however little agreement on the specifics
resulting in only minority opinions.

The Majority Opinion. A majority opinion could
not be established based on the interview responses. The
lack of consensus in this area tends to show the respondants
did not find a commonly perceived shortfall in the implemen-
tation. More to the point, though some shortfalls existed,
none were pervasive enough through-out the organization to
engender a common response.

The Minority Opinion. There were four minority
opinions. The first minority view expressed the desire that
the users need to be more involved in the implementation and
contacted daily if possible (8)(54)(27). The second
minority view had various qualifications to the answers but
presented the bottom line viewpoint that there was no real
problem, since by and large the effort(training, scheduling
and quality of equipment) were planned very well (48)(30)
(42). The third held the belief that the system was to
oriented toward providing support to upper management (i.e.

reporting) and too little support to the users (i.e.

applications)(46). The fourth group said that there was not

enough time to plan, and more development was needed since

training and user friendliness were essential (56)(41).

Additional Comments and Interviewer Observations. In

addition to the responses to the specific questions, the

respondents often made comments or observations, generaliz-

ing aspects of the implementation as a whole. Also, though

not specifically questioned there were observations made by

the interviewer that may suggest factors influencing the

process. Since, the literature indicated that organiza-

tional context and structure may have an effect on an

implementation these additional observations are important.

In all the questioning there were four prevalent

observations that were present or were represented by at

least one opinion in all questioning areas. First, the most

predominant observation was that if the implementation was

to be successful, the change had to be desired by the user.

Secondly, the there was a persistent belief on the part of

the interviewees that user needs and user involvement had

been considered. Third, was that the NCR official respons-

ible for the implementation was one of the organizations

senior most official. Specifically, the Senior District

Manager Mike Wine. Finally, in one of the more structurally

oriented aspects, it was understood by the NCR personnel

that training was not mandatory.

The B-1B SPO IS/OA Implementation

The B-1B SPO IS/OA information was obtained from nine employees of the B-1B SPO. The personnel were all randomly selected from the same office location, Wright-Patterson AFB (Dayton Ohio), within the same building, and same office setting. This was done to ensure that the selection of personnel from the B-1B SPO came from an office environment similar to that of NCR. The experience of the personnel with the U.S. government ranged from 1 to 30 years. The positions held by the interviewees included various levels of management from secretary/typist to Assistant SPO Director. The Information Resource Office is the primary implementor of the information system effort and the B-1B SPO offices are the primary users.

The personnel interviewed and their job descriptions are as follows:

Jerome Sutton	Assistant System Program Director
Robin Ignatowski	Secretary
Capt Kevin Williams	Executive Officer for B-1B SPO
Julie Wanstrath	Financial Specialist
Ann Hadorn	Financial Specialist
George Becker	Chief of Configuration Control
Lt Michael Winslow	B-1B SPO Information Resoures Manager
Evelyn Mohn	Data Management Specialist
Tammy Bartlett	Secretary

The interviews were conducted from 15-16 July 1987, at the B-1B System Program Office, Wright-Patterson Air Force Base, Ohio.

Presentation of Interview Material

This section contains a compilation of responses to the interview questions outlined in Chapter I. In a fashion similar that used for the NCR responses, the B-1B SPO responses are grouped into majority and minority opinions in an effort to identify how important the research areas were in determining an unsuccessful implementation. Though many responses contain elements often related to either group, description and elaborations (given by the interviewees) were used as the intended meaning to faithfully classify the answer. Most important, it should be remembered that these responses are interpreted subjectively. A complete synopsis of the answers obtained by the informal interviews at the B-1B SPO are in Appendix B.

Synopsis of B-1B SPO Interview Responses Group by Majority/ Minority Consensus

Measure of Successful Implementation. The interviewees were asked what they believed made an IS/OA successful. The respondents had an extremely wide range of view points, indicating the personnel did not share a common set of goals for the implementation of the IS/OA.

The Majority Opinion. Of the interview answers
expressed on this issue, none could be grouped to allow for
a majority answer. In fact the largest groupings consisted
of only two replies, and since there were two of them
neither could be determined to represent a consensus.

The Minority Opinions. The diversity of opinion
on this issue is evident. Of the nine interview answers,
there were seven minority opinions. In the first grouping
of opinions, the respondents believed the measure of a
successful implementation should be an increase in produc-
tivity, a system that is simple to use, and a reduction of
effort (50)(55). The second opinion considered a reduction
in the amount of manual reference (to books) and accom-
plishing the job as easy as possible as measures of success
(22). The third group of opinions expressed the belief that
a successful implementation had to save time, do the job
faster and do the job easier (4)(3). The next opinion
emphasized the commonality and standardization of a system
as being of primary importance (19). The fifth opinion
indicated user satisfaction and user friendliness (57). The
sixth opinion specifically desired consistency, efficiency
and compatibility to be the best measure for success (53).
In the final opinion the success criteria chosen was a
reduction of labor and paperwork. In particular, the
automation of all documentation (31).

Top Management Support. The interviewees were asked
what support from top management they received. On this
issue the respondents had a narrow range of viewpoints from
no visible support to limited involvement.

The Majority Opinion. The majority opinion was
comprised by five of nine responses. In this opinion, the
interviewees expressed the theme, that no real management
action had been seen, nor had any pressure been evident to
get computers. However all the respondents indicated that
they got what they wanted when they asked for it
(55)(53)(19)(4)(3).

The Minority Opinions. There were three minority
opinions on this issue. In the first minority opinion, two
of the nine respondents indicated that the size of the
investment indicated the extent of top management action and
support (50)(31). In the second opinion, the indicator of
top management support was believed to be the emphasis the
supervisor place on responding to a need survey. In
essence, it was felt the supervisor would not have
considered a one page survey as important unless pressured
by superiors (22). The final minority opinion indicated
that since top management made all the assignments and had
a requirement to track the implementation progress, these
actions were an indicator of their support. In particular,
the submission of by managers for increased capabilities
(57).

Information Systems Planning. The B-1B SPO personnel
were asked what information system planning had they been
aware of or had personally seen. There was a strong
diversity of opinion on this topic, ranging from no planning
at all to active involvement in the planning process.
However, what is unique about these responses is the fact
that so few answers were elaborated on by the interviewees.

The Majority Opinion. The majority opinion was
comprised of three of the nine opinions expressed. In this
opinion the interviewees found no evidence of planning at
all (55)(57)(3). Almost as important, the replies used for
this grouping were without any additional qualification
(i.e..remarks).

The Minority Opinions. For this question there
were four minority opinions. In the first opinion, the
respondents believed that the system had been allowed to
evolve in preference to overt planning (50). In the second,
it was indicated that interviewee believed the contractor
had performed the planning (31). In the third opinion,
(even though no effort was seen) it was believed that
planning had been done because what was asked for was
received (53)(4). In a final grouping of opinions, the
interviewees stated that planning was done, and their office
had provided hardware and software requests based on re-
quirements, needs, and workloads (22)(19).

Problems Encountered. The interviewees were asked as to what problems were encountered in the implementation. The predominant answer dealt with hardware and software problems yet were diverse enough to allow for several different groupings.

The Majority Opinion. Five of the nine opinions comprise the majority opinion. In this area the respondents essentially believed that the main problem was in the speed of the computer system. Also, the users felt this problem was compounded, because the system was awkward to use, the software unreliable, the hardware was unsophisticated (limited in ability) (55)(53)(19)(4)(3).

The Minority Opinion. There were four minority opinions on this topic. First, a respondent found the hardware, such as the printers, was broken too often (22). In the second minority opinion, the interviewee believed that the lack of a champion was the greatest problem. Specifically, the lack of a champion for the system resulted in increased organizational resistance to the change. Almost as important, the lack of a champion for the user permitted a system (which was considered inadequate) to be fielded (50). Third, this respondent identified the primary problem as a lack of common database, which in turn made the users antagonistic to the computer (57). In the final opinion, the interviewee identified the main problem as being the acceptance of a system that still had bugs (31).

User Needs/Human Factors. The interviewees were asked how were the user needs and human factors considered? On this topic almost all the B-1B SPO responses were unanimous in that they believed the user was considered. However these answers when qualified, could not be placed in a single group.

The Majority Opinion. The majority opinion consisted of four of the nine opinions expressed. This opinion was essentially both that training and system support were adequate. Specifically, the training was available when needed, and there was enough support to keep the system running (53)(4)(57)(3) (ie..not related to the identification of problem areas in the previous question).

The Minority Opinions. There were four minority opinions on this question. In the first opinion, the respondents found that while training was available the user was only considered as part of the system evolution (50). Specifically, the user needs were considered as the need arose and not by intent. In the second minority opinion, the interviewee stated that he saw no evidence of user needs being considered (55). Third, the largest of the minority opinions, (comprising two of nine), found that the user needs were considered by allowing personal requests to be submitted directly or through a directorate (22)(19). The

fourth respondent believed the user needs were being considered since the user manuals improved and official training was now offered (31).

Lessons Learned. The interviewees were asked what they would do or like to have seen done different. The answers to this question tend to confirm those areas identified as problems, in that they are mentioned in this section as being necessary to correct.

The Majority Opinion. The majority opinion consisted of three of the nine interviews. Specifically, the respondents believed that the software must be considered earlier and asserted the need to plan for common databases (50)(57)(53). What is important in this grouping is that it confirms the background premise of Chapter I. In brief, the original problem was in large part due to the inability to cross-reference data stored on three uncommon databases.

The Minority Opinion. There were six minority opinions. In the first, the respondents indicated a desire for refresher training to have been established since the initial training was done too far in advance (22). In the second, the interviewee identified the need for more standardization in hardware, in as much it was to inconvenient to learn several systems (55). Third, this respondent, felt the need to do more planning and research before committing to an IS/OA. Including at the least, an

effort to be made to learn from previous implementations
(19). The next minority opinion believed that the system
response time, speed, and processing power were inadequate
and should have been considered (4). Fifth, the interviewee
thought a different contractor would make a difference, in
the IS/OA as well as stronger incentives to obtain better
performance (31). Finally, a respondant felt that the
system could be faster and provide more power, but basically
she was satisfied (9).

Additional Comments and Interviewer Observations. In
addition to the responses to the specific questions, the
respondents often made comments or observations, gener-
alizing aspects of the implementation as a whole. Also,
though not specifically questioned there were observations
made by the interviewer that may identify factors influenc-
ing the process. Since, the literature indicated that
organizational context and structure may have an effect on
an implementation, these observations are important.

In all the interviews there were three prevalent
observations that were made or were represented by at least
one opinion in all questioning areas. First, while the
implementation was considered less than successful by the
participants, they also expressed a desire for the IS/OA to
take place and for more state of the art technology; not a
regression to an older means of doing business. Second, the
officer in charge of the implementation was a second

lieutenant and functioned at a level of management approximately three levels below the assistant SPO director. Though the ability of the officer was never questioned, the literature tends to indicate that the position and rank of the executive in charge, relative to their own organization, may influence the degree of success the implementation achieves [Ein-Dor Segev 1978][Ein-Dor Segev 1982]. Third, the final aspect was that training in the B-1B SPO was not mandatory.

Comparison of Majority Views

In this section the majority opinions of the NCR and B-1B SPO responses are compared to identify potential determinants of a successful implementation. Specifically, the consensus that are/are not obtained for each of the research areas are compared. The resulting similarities and differences will serve to identify which aspects of the research areas are related to a successful implementation.

Measure of Successful Implementation. Of the NCR and B-1B SPO responses on this topic, NCR was clearly able to establish a specific success criteria for their information systems implementation. In particular seven of the nine responses were in agreement as to what comprised a successful implementation. In contrast there was no consensus of opinion in the B-1B SPO responses to any of the identifiable measures of success. This tends to indicate

that for a successful implementation to be perceived as such

depends greatly on having a standard or set of agreed upon

goals against which it may be compared. But just as

important the goals set for the system must be known

throughout the organization.

Top Management Support. In this comparison, both NCR

and the B-1B SPO generated a majority consensus as to the

level of top management support received. However, the

opinions were diametrically opposed. In the NCR responses,

top management support was made clearly evident by specific

actions and directives. In contrast, the B-1B SPO personnel

found no management action or pressure for computerization.

This finding tends to indicate that the success of an

implementation is dependent on the participation of top

management in the implementation. However, what was unique

here is that both indicated they got whatever they asked for

to do the job. Thus indicating that the perception of top

management involvement may be as important as their actual

involvement. Also, the involvement of top management would

tend to give greater structure and purpose to an IS/OA

acquisition and be consistent with the establishment of

organizational goals.

Information Systems Planning. As with the two previous

comparisons, the majority opinion of NCR on this topic is

opposite to those of the B-1B SPO. In the NCR response,

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the interviewees showed a great awareness of corporate planning activities. However, the B-1B SPO opinion found no evidence of a planning effort.

This finding tends to both confirm and be consistent with the findings in the two previous areas. In essence, the establishment of strong goals and an active top management would require a coherent planning effort, which is evident in the NCR example. Therefore a planning effort that at least is perceived as encompassing the scope and goals of an implementation is a determinant of a successful IS/OA implementation.

Problems Encountered. In comparing the problems encountered, the NCR position is again in opposition to that of the B-1B SPO. NCR was unable to generate a group consensus on the problems of the implementation, where as the B-1B SPO was able to generate a strong consensus of opinion identifying specific problems. This tends to indicate that as an implementation becomes more successful the number of commonly perceived problems decrease. Thus as the organizationally accepted goals are achieved and satisfied the less the consensus there is about a common problem. In essence, this would be consistent with establishment of criteria by which the success of an implementation can be measured. Related to this, the consensus about a common problem tends to indicate a failure of the IS/OA to achieve a goal or goals perceived by the

users as important. In fact, this is consistent with the actual findings in the measurement of successful implementation response for the B-1B SPO, in that no consensus as to a common goal was found, therefore none could be satisfied by the IS/OA.

User Needs/Human Factors. In the area of user needs and human factors NCR and the B-1B SPO interview results both had majority opinion groupings. In the NCR opinion there was a demonstrated faith in a well-defined corporate process to consider the user. Though not as complete in their faith of an organizational consideration of user needs, the B-1B SPO did find the area of training "adequate" for the user. This tends to indicate that user need consideration is perhaps a force multiplier, in that its presence is required in an implementation but the extent of its value is not exploited unless combined with the factors of effective success criteria and planning.

Lessons Learned. In this final comparison, the NCR interviewees were again unable to develop a majority consensus of how to do things differently. By contrast, the B-1B SPO was able to generate a consensus in this area. Specifically that the system software and common databases should be considered sooner in the process. These findings tend to confirm the other areas. Simply, the lack of a consensus on the NCR results indicate no single overwhelming problem that was not addressed, by the implementation; and

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again confirming the satisfaction of any success criteria, management direction, and planning efforts.

Summary of Majority Opinions. A summation of the findings presented in the majority opinions can be found in Table 4.0. This table recaps the majority opinion consensus of each case study, by research area.

General Comparison of Minority Opinions

In the general comparison the minority views are compared for any common themes or similarities. Most minority views obtained by the interviews had specific conditions that in essence qualified them as minority views, or rather prevented them from being grouped into the majority view. In this section the specific qualifiers are listed by interview que_tion area and the results of the NCR answers are compared in a matrix to the B-1B SPO answers. The matrix will show those areas were the minority answers are in agreement and where they differ. Also this matrix will aid in either confirming or denying the accuracy of the majority response groupings as well providing further research material.

Measure of Successful Implementation. The findings of the minority opinions in this area tend to confirm the majority findings of both the NCR and B-1B SPO interviews. In essence, the B-1B SPO was not able to generate a

TABLE 4.0

Matrix of Majority Opinions (Summary of Majority Consensus)

	NCR Consensus	B-1B Consensus
Measure of Successful Implementation		
Achieve goals set for it	X	
No consensus		X
Top Management Support		
Strong evidence of support	X	
No real management action seen		X
Information System Planning		
Great awareness and involvement in comprehensive planning efforts	X	
No evidence of planning at all		X
Problems Encountered		
No consensus	X	
Poor system speed, unreliable software, unsophisticated hardware		X
User Needs/Human Factors		
Aware that user needs were considered	X	X
Lessons Learned		
No consensus	X	
Earlier consideration of software planning, and for common databases		X

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consensus as to what constituted a successful implementation and, as Table 4.1 shows, the minority opinions for the B-1B SPO were very diverse and indicate a lack of any singular goal being agreed upon by the users. In essence the B-1B SPO personnel interviewed did not have a common perception as to what purpose the B-1B SPO IS/OA served or goals it was to achieve. On the other hand the NCR opinion was very strong in the majority and, as Table 4.1 shows, there was little if any minority dissent, confirming a strong and organizationally accepted set of system goals.

Top Management. The findings in this minority opinion (as shown in Table 4.2) again tend to confirm the majority findings. The comments for the NCR positions clearly list the less active management attitudes, where as those attributed to the B-1B SPO management tend to be the more active. Simply put, the minority opinions are in opposition to one another as are the majority positions. Thus it appears that the greater the active management involvement the more successful the implementation.

Planning. In Table 4.3, the minority opinion in this area apparently confirms the majority opinion. The more negative aspects of a planning effort are found in the NCR minority opinions as are the more positive found in those of the B-1B SPO. Simply, this would tend to confirm the value of planning to the goal determination process and the establishment of success criteria.

TABLE 4.1

Matrix of Minority Opinions
(Successful Implementation Measurement)

	NCR	B-1B
If people use it	X	-
Few complaints	X	-
Increase productivity	-	X
Simple to use	-	X
Something that would be used	-	X
Do job as easy as possible	-	X
Little reference to the books	-	X
Consistency in operation	-	X
Efficient	-	X
Compatible	-	X
Error checking capability	-	X
Time saver	-	X
User oriented output	-	X
Do job faster	-	X
Commonality	-	X
Interoperability with other systems	-	X
Satisfies needs of the users	-	X
Does what is asked (perform as desired)	-	X
User friendly	-	X
Automate documentation	-	X
Reduces labor	-	X
Reduces paperwork	-	X

TABLE 4.2

Matrix of Minority Opinions
(Top Management Support)

	NCR	B-1B
Hands off	X	-
Act only when there was a failure	X	-
Hired and pay for an admin branch	X	-
Not visible	X	-
Pressure to meet goals	X	-
Informal (heard through the grapevine)	X	-
Willingness of middle management to make the change	X	-
Expected to attend training (implied)	X	-
Scope of the change	X	-
Management keeping their schedule	X	-
Sizable corporate investment	-	X
Downward directed	-	X
Problems are addressed faster	-	X
Survey was taken on the type of work done	-	X
The supervisors felt were necessary	-	X
The ideas and recommendations	-	X
Assignment of projects	-	X
Requirement for tracking information	-	X
Definition of capabilities	-	X

TABLE 4.3

Matrix of Minority Opinions
(IS/OA Planning)

	NCR	B-1B
Downward directed	X	-
No formal planning	X	-
Responsibility of someone else	X	X
Had minimal input or not involved	X	-
Grew up or evolved	-	X
Contractor planned	-	X
Involved in system requirement process with contractor	-	X
Surveys were used	-	X
Sent in Requirements	-	X
Match allotment to greatest need	-	X
Based request on workload and type of operations	-	X

Problems. These findings (presented in Table 4.4)
have little effect on either the confirmation or denial of
the majority opinion. However one point should be noted,
the majority opinion for NCR was inconclusive, and the
minority opinions in this matrix for NCR are more numerous
than the three previous categories where NCR held a majority
consensus. The important fact here is that it would enhance
the concept that a consensus around a single problem would
indicate an unsuccessful implementation, which did not occur
for NCR but did for the B-1B SPO.

TABLE 4.4

Matrix of Minority Opinions (IS/OA Problem Identification)

	NCR	B-1B
Did not know what to expect	X	-
Did not get advanced knowledge	X	-
Did not hear complaints	X	-
No formal plan	X	-
Had to make the equipment work (suitability)	X	-
Too much too fast (technology)	X	-
To keep shorterm schedule/manual work goes up	X	-
Massive amount of training (Volume)	X	-
Getting equipment (logistics)	X	-
Deciding what to get	X	-
Getting people familiar with the system	X	-
Getting people trained (time consuming)	X	-
Knew of no problems	X	-
Hardware broken too often	-	X
Waiting for delivery	-	X
Training done without hardware	-	X
No champion	-	X
Resistance from users	-	X
System overloaded and slow	-	X
Uncommon databases	-	X
Users antagonistic to computers	-	X
Uneducated users	-	X
Chronic problems (Same ones)	-	X
Accepted an unproved system (unreliable)	-	X

User Needs. This area tends to confirm the majority opinions of both the NCR and B-1B SPO, that user consideration or rather the faith of the user, that their needs had been considered. In particular, in Table 4.5 the issues addressed are those that deal with direct user interaction and preference, which would be consistent with the idea that the user in both cases accepted the fact that their requirements had been considered though not directly.

Lessons Learned. The minority responses in this area (presented in Table 4.6) are inconclusive. Specifically, the responses are so diverse they do not indicate a trend, nor do they as a group, lend support to either majority position.

Comparison of Additional Observations

This section will compare the additional comments and interviewer observations that have been identified throughout the course of this chapter.

In this comparison there are three points that appear to be common to both implementations. The first similarity is that in both the implementations the change was greatly desired by the participants. In fact, in the B-1B SPO it appeared to be the one aspect of their effort that tended to influence many of the participants to overcome manually many of the flaws in their IS/OA. Second, in the area of training neither found it necessary nor desirable to make it

TABLE 4.5

Matrix of Minority Opinions
(User Needs/Human Factors Consideration)

	NCR	B-1B
Massive training	X	–
Systems that are more user friendly	X	–
Organization answers complaints fast	X	–
People were available who understood problems	X	–
People were consulted on what was wrong and what to change	X	–
No real consideration	X	X
Considered case by case	X	X
Given choices when possible	X	X
Good training made available	–	X
Modular furniture on request	–	X
Evolution	–	X
Training set up beforehand	–	X
Placed for the most convenient use	–	X
Training was offered	–	X
Better user Manuals	–	X

TABLE 4.6

Matrix of Minority Opinions
(Lessons Learned)

	NCR	B-1B
Need more user involvement	X	-
More management responsiveness to criticism	X	-
Ensure good applications (quality)	X	-
Need more follow-up training	X	X
Training was of limited benefit	X	-
People must be prepared to do on their own	X	-
Training needs to be convenien	X	-
Training needs a higher priority	X	-
Too much on how helps management	X	-
Not enough emphasis on improving the job	X	-
Not enough time to plan	X	-
Make sure applications are user friendly	X	-
Need to let evolve	X	-
Don't put through too much too fast	X	-
Training done too far in advance	-	X
Select better hardware	-	X
Need standardization	-	X
Need easier to use system for non-users	-	X
More research on what's being done elsewhere	-	X
A pilot site	-	X
A larger MIS office	-	X
Cost not worth the result or do not have the funds	-	X

TABLE 4.6

Matrix of Minority Opinions
(Lessons Learned) (Continued)

	NCR	B-1B
Need improved response time	−	X
Too much dependency on others	−	X
Different contractor	−	X
Better testing	−	X
More incentives to do job better	−	X

mandatory, which may or may not be related with the aspect
of desire. Thirdly, neither the B-1B SPO nor the NCR
personnel indicated that money was a concern. Specifically,
both organizations indicated that the pretty much received
what they asked for. This would further tend to reinforce
the research questions as the proper area for research, as
well as increasing the similarity in structure of the two
organizations.

Organizationally there was one obvious difference in
the administration of the two implementations. The
individual in-charge of the NCR implementation was a senior
corporate executive whereas the B-1B SPO placed the respons-
ibility for the implementation with a junior officer. This
fact tends to confirm the findings of the majority and
minority comparisons as to the importance of top management
involvement in the implementation being needed for success.

In essence, both the literature and the findings confirm the need to have the involvement or perceived involvement of top management in the IS/OA process (13)(14)(51)(39). Specifically, within the organization the rank of the individual must accepted as representative of top management whereas this was perceived in the NCR example, it was not in the B-1B SPO (13)(14).

Final Analysis. In this final analysis there are five aspects based on the comparison of the two implementations that appear be consistent in determining a successful implementation and can be used to develop effective policies and guidelines.

First, the comparisons strongly indicate that a set of well-defined goals and organizationally accepted success criteria are consistent with successful IS/OA implementation. Secondly, the opinions as well as the additional comments sections tend to confirm that a highly visible top management is also a strong ingredient in a successful IS/OA. This analysis is most strongly supported by the fact that the implementation at the NCR was headed by a senior executive vs a junior officer at the B-1B SPO. Third, the general consensus of opinion supports the necessity of establishing a well-regulated and publicized planning process. This position is further strengthened by the fact that the logical result of a strong planning process should

be a coherent set of goals. But just as important is that a strong planning effort would be consistent with a strong top management support effort.

The fourth aspect that is indicated is that there appears to be little difference between the commercial implementation and the government implementation in the application of management concept especially in the areas of financing, user support, and training. First, neither NCR nor the B-1B SPO indicated a majority position nor strong minority position that there was any funding limitation to answering their needs. Second, neither of the implementations made the training mandatory. Third both organizations indicated that they greatly desired a change for the better, thus indicating an equivalent desire by both institutions to improve their work environment.

Fifth, the consideration of user need satisfaction also appears to be an important ingredient in IS/OA implementation. In this area both the NCR and B-1B SPO nad user support indicated. However, in the case of the B-1B SPO it became evident that it was consistent with the fact that many problems were overcome manually or through education. Therefore its presence in the NCR responses tends to indicate a synergistic value to a successful IS/OA effort.

Summary

This chapter has presented findings and analysis based on the comparison of the B-1B SPO IS/OA and the NCR effort. In the first part of this Chapter the interviews were collected and grouped by the degree of consensus obtainable. Specifically, the opinions expressed were classified as either a majority opinion or a minority one. The second part of this chapter, compared the majority opinions expressed to determine what differences existed in the replies. This was done to isolate any particular factor in the research question area that might distinguish the successful implementation from one that was not as successful. Next, the minority opinions were examined in an effort to confirm the majority responses or indicate any previously unseen trends. The extra benefit derived from this examination was a set of tables that could be useful in future questionnaire development.

The fourth part of the chapter compared the additional observations collected by the interviewer. This comparison served to establish the readily perceivable organizational context effecting the implementation. Finally, this chapter presented an analysis of the information, and provided the findings which held consistent throughout the comparison process. These findings are thus the foundation for the following Chapter V (Conclusions and Recommendations).

V. Conclusions/Recommendations

Overview

The purpose of this chapter is to present conclusions and recommendations that can be derived from the interview material analyzed in Chapter IV. The differences and similarities that resulted from the comparison of NCR and the B-1B SPO are used to identify the determinants of a successful implementation. These determinants will then be used to develop recommended policies and guidelines for future implementations and areas for further research. Specifically, the first part of this chapter will present the conclusions that will answer the seven original research questions of Chapter I. The second part of this chapter will present recommendations that provide a possible answer to the original problem statement.

Conclusions

In this section the results of the findings and analysis from Chapter IV are used to identify specific and general conclusions that are consistent with a successful IS/OA implementation effort. More specifically the results derived by the majority and minority opinion comparisons are used to generate conclusions the answer the original Chapter I research questions.

Specific Conclusions. Based on the Chapter IV analysis there are four specific conclusions that are possible. They are as follows:

1) A successful implementation appears to require specific criteria and organizationally accepted system goals. In particular, these goals are necessary to provide a basic measure so the relative success of an implementation can be determined. But just as important these goals must be actively pursued by the organization.

2) The top management support that is direct and consistent in its own actions appears to be tied directly to IS/OA success; especially, top management support that is overt, unmistakable, and highly visible.

3) An active planning process, and an active program that ensures the personnel are aware of the planning process, is consistent with a successful implementation.

4) There is no difference in terms of funding, user consideration, and training between government and civilian implementations, at least as perceived by the personnel interviewed.

General Conclusions. Based on the Chapter IV analysis there are four general conclusions that are possible but may require further research. These conclusions are based on

factors that are not tied directly to implementation
success. They are as follows:

1) The analysis of interview material in the area of
   problem identification found the trend, that the
   more successful an implementation the greater the
   number of minority opinions and (in the Chapter IV
   example) no majority consensus. Also the more
   unsuccessful an implementation the greater the
   consensus on particular problems. This finding
   assumes that the lack of the identification of a
   central problem indicates that a successful
   implementation has satisfied commonly perceived
   goals and that a less than successful has not.
   Therefore, it should be possible to determine the
   relative success of an implementation and then use
   that information to correct the problem.

2) The consideration of user needs appears to have
   synergistic effect in improving an implementation.

3) The analysis of the interview material found the
   trend that the majority opinion of the B-1B SPO
   implementation in the lessons learned area (which
   was less than successful) tended to match the
   majority responses in all areas of the NCR
   (successful) implementation. The important point of
   this conclusion is that it indicates a model for a
   successful implementation can be developed based on

the information derived from either a failed effort
or a successful one. In essence, this means that
the results from one effort (such as a pilot site)
can be used as a basis for beginning or improving a
new effort.

4) A change that is desired tends to alleviate many
user and organizational problems, and indicates a
greater degree of self-motivation or the degree of
perceived need among the users. Simply, the more a
change is needed, the greater it is desired or
perceive to be needed.

The conclusions presented thus far are summarized in
Table 5.0 on the following page. This table lists the
specific and general conclusions by research area that were
found consistent with a successful IS/OA.

Recommendations

In this section the conclusions are used to identify
specific, general, and future recommendations that may be of
benefit to other IS/OA implementation efforts. Specifically,
these recommendations answer the original problem statement
by providing the recommended guidelines necessary to
increase the effectiveness of IS/OA efforts in an Air Force
environment, in particular the B-1B SPO.

Specific Recommendations. Based on the conclusions
there are three specific recommendations that should be used
for guidelines in establishing an IS/OA.

TABLE 5.0

Matrix of Research Conclusions
(Conclusions Consistent with Successful IS/OA)

	Conclusions	
	Specific	General
Implementation Measures	Specific goals and criteria	
Top Management Support	Highly visible direct and consistent	
IS/OA Planning	An active process (comprehensive)	
User Needs Consideration	Evident in all phases	Synergistic effect, desired change alleviates system problems.
Problem Identification		Less successful implementation produces greater consensus on problem areas
Lessons Learned		Can be used to obtain results useful in improving other efforts.
Transference	No difference found in perception	

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1) Specific success criteria be established for
   the IS/OA implementation that are highly visible and
   easily identifiable. This recommendation is
   important because, it is contrary to the literature,
   which found success to be a perceived measure.
   However, the Chapter IV analysis tends to indicate
   that the establishment of common perceptions is
   achievable through organizationally accepted goals.

2) A complete and comprehensive planning effort be
   established, consisting of, as a minimum,
   coordinated activity schedules, extensive efforts
   directed toward user awareness, well-publicized
   schedule deadlines, a planning charter with stated
   goals, and hardware/software to meet common needs.
   This recommendation is at odds with the literature
   which found no data to support any particular
   strategy or guideline as being effective in planning
   an implementation. However, this recommendation is
   strongly suggested by the Chapter IV analysis.
   Specifically, they are derived from the majority
   responses.

3) Appointment of an executive agent (the officer
   directly responsible for the implementation) that is
   senior enough in rank and position to represent
   (realistically) the will of top management. This
   recommendation differs from the literature in only

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one respect, the literature indicates a top

management involvement in the decision-making and

implementation at all organizational levels is

important; however the Chapter IV analysis indicates

that the closer the top management is to the actual

implementation the greater the coherency of goals,

planning, and perceived support.

General Recommendations. Based on the general conclu-

sions there are four recommendations. These recommendations

are for general policies and tools that may be used for an

implementation and as such are not tied to a specific office

environment. The four recommendations are as follows:

1) Establish an active effort to research previous

   IS/OA efforts in similar office environments to help

   identify peculiar factors that may be useful in

   advanced planning. This method is not specifically

   supported by the literature review but is strongly

   indicated by the Chapter IV analysis and general

   conclusion 3.

2) Use structured surveys and interviews as a means

   to determine if an implementation is perceived as

   successful by determining which goals are not being

   met or which problems are emerging. In essence, the

   success of an IS/OA is a perceived measure,

   therefore it is important to determine what goals

   are commonly perceived by the users as important and

if they are being achieved. This method is not specifically supported by the literature but is strongly indicated by the Chapter IV analysis and general conclusions 1 and 3.

3) Ensure a highly visible effort is undertaken to consider user needs. But just as important is the inclusion of user inputs into the planning process. This recommendation is generally supported by the literature and general conclusion 2. However, the literature does not have a consensus that specifies how the user is to be considered. This recommendation takes into account the premise that the user's perception of being considered is important.

4) Include in the planning process a conscious effort to determine by interview or attitudinal survey where, organizationally, the greatest desire for change exits. In this way the greatest immediate use may be made of an implementation with the least difficulties. This method is not indicated in the literature, however, the recommendation is indicated by general conclusions 1 and 4.

The recommendations presented thus far are summarized in Table 5.1 on the following page. This table lists the specific and general recommendations by research area that were found consistent with the specific and general conclusions.

TABLE 5.1

Matrix of Research Recommendations
(Recommendations Consistent with Conclusions)

	Recommendations	
	Specific	General
Implementation Measures	Establish specific criteria and organizationally accepted goals	
Top Management Support	Appointment of senior executive	
IS/OA Planning	Establish comprehensive effort, user awareness, stated goals, common needs	Determine areas of greatest change desire for most immediate results.
User Needs Consideration		Ensure high visibility of user need consideration increase perception
Problem Identification		Use surveys and interviews to determine success of implementations by determining unmeet goals or problems.
Lessons Learned		Establish active research into previous efforts to identify useful factors
Transference		Establish active research into previous efforts to identify useful factors

<u>Future Recommendations for Follow-on Studies</u>.

Based on the results that were achieved through this limited study, the Air Force would benefit from further research in the area of IS/OA. Specifically, the current trend toward increased office automation and computerization of the work place increases the need to examine the factors that lead to successful IS/OA. Three suggestions for additional research are presented:

1) Utilize the results found in Chapter IV in the development of a survey instrument. Such an instrument should be applied to establish the strength of each of the research areas and ultimately the value each variable has in determining the overall success of the organization. Specifically, this thesis has used a limited base of information. The use of a survey over a larger population would give an empirical value to these variables.

2) Test the use of the attitudinal survey method and determine where an implementation would be most effective then via comparison identify to what extent the desire for change increases the effectiveness of an implementation.

3) Utilize this entire method again except modify it by using an organization not yet involved in an implementation. If the technique is valid then it

should be able to predict the initial success or failure of a new implementation. Specifically, the same research areas that developed a consensus in this study should produce similar results.

4) Establish a pilot project to further test the concepts of success and problem prediction indicated by the general conclusions 1 and 3.

Summary

The research presented in this paper is based on the interviews of 18 people in two organizations. Therefore the scope is limited as to what can be realistically recommended. However, this study has achieved three important goals. First, the research has provided the basic framework necessary to begin the development of a coherent policy for future IS/OA implementations. Second, the information has reinforced the need to establish an orderly process by which the success of an IS/OA can be determined. Finally, the study has shown that there are tools and methodologies available that can be used to help determine how to implement an IS/OA to greatest benefit of the Air Force.

Appendix A: Synopsis of NCR Interviews and Responses as
            Classified by Majority and Minority Opinions

The following is a synopsis of the replies to the informal interview questions. The responses have been sorted by majority/minority opinions. The responses have been edited so the intent of the entire response could be conveyed.

MEASURE OF SUCCESSFUL IMPLEMENTATION

The interviewees were asked as to what they believed made an implementation effort successful.

THE MAJORITY OPINION

In the end if it (tne IS/OA) achieves tne goals that were set for it (56).

If it reduces paperwork and (I) have at my fingertips the ability to do work (8).

If it does the actual job, and (I) can get in and out quickly (54).

If it (IS/OA) increases sales productivity (meets increased quotas and sales). The reasoning here is if the paperwork takes up less time then the salesman will have more time to devote to sales and thus will increase sales productivity (48).

An increase in productivity with less time spent on paperwork (46).

The end product being accurate and timely (since paperwork is primarily management documents). Also, if the people can do more projects and can start to do things not in the current charter (41).

If it meets the needs that are identified, effectively and efficiently (27).

THE MINORITY OPINION

If the people use it (30).

By the number of complaints that are received (42).

MANAGEMENT SUPPORT

The interviewees were asked what top management support did they receive.

THE MAJORITY OPINION

Top down direction, (they) gave us the budget and expected results in 1 to 2 years (56).

Management tracks the performance (of the implemetation effort) and gives downward direction (8).

A task force was set up by top management and there was no quibbling about money. The task force was given direct decision making authority (48).

Provided the tools and the money and expected results (30).

THE MINORITY OPINIONS

Minority Opinion #1
Hands off (they acted only when there was a failure). They hired and pay for an administrative branch to be the competent experts (46).

Not a visible support, but there is pressure to meet goals. Support is heard through the grapevine via word of mouth (27).

Minority Opinion #2
Need middle management desire, they must demonstrate willingness to make the change before the rest of the office will (42).

Minority Opinion #3
Not really visible, but were expected by management to attend training. Bottom line is the scope of the change indicated the management support (54).

Upper management keeping their schedules, when they keep theirs then the rest can be kept. Must showo their support by keeping their schedules; helps their credibility (41).

INFORMATION SYSTEM PLANNING

The interviewees were asked what information system planning was done.

THE MAJORITY OPINION

Top management called in consultants who recommended the creation of a task force to identify problems. The consultants and the task force used surveys. The surveys were directed at determining what would make the salesmen more productive. They (the task force) set a sales advisory council to identify all the system parameters and to make sure the requirements were defined (56).

Planning was done by a task force. They used surveys to develop and determine the tasks that had to be done and used interviews to try to cover exceptions (48).

We had meetings to ensure logistics (ie..training, schools, books, checklists, upper management requests) could meet the proposed schedule and plan. Gave the preference to those that wanted them first (46).

The preliminary planning was done at the top. The pilot site was chosen, installation done, system developed and a cadre developed at the direction of top management (42).

Mainly saw the analysis and surveys, however when the pilot was selected and it ran successfully, it became the plan (41).

Schedules provided by the top, gave the dates for implementation events and the activities we had to accomplish (27).

THE MINORITY OPINION

Minority Opinion #1
Not sure there was a plan. There was a lot of preinformation, so everyone was ready. Had a pilot site so everyone knew the change was real (8).

Had a schedule but knew of no formal planning (not really evident)(54).

Minority Opinion #2
Not involved, it is the responsibility of the administrative branch to do the planning (The administration's job is to do service and support). I had minimal input (30).

PROBLEMS ENCOUNTERED

The interviewees were asked as to what problems have
been encountered in the implementation.

THE MAJORITY OPINION

There was no majority opinion.

THE MINORITY OPINIONS

Minority Opinion # 1
Nothing beyond the normal expected learning curve.
Expected to have to fix something, but nothing really wrong
yet (48).

Don't see any real problem (30).

Not a whole lot, most were thought out in advance. We
were provided a method of change over and used what was
learned in the pilot effort (41).

Minority Opinion #2
Did not get the information from the pilot site as to
what problems to expect so I did not hear their complaints.
We had to overcome and make do with new equipment (8).

Did not know how to access the system. But did have a
way to report the problem that made it livable (had prompt
repair)(54).

Too much too fast, the initial implementation caused
the manual portion to go up in the shortrun becaues we still
had to hold to the schedule (46).

Minority Opinion #3
The problems we had were when the system was outside
the control of the office, once under our direct control
they were better. The stronger the desire there was for the
equipment the fewer were the complaints (27).

Minority Opinion #4
The massive amount of training, and the educational
process takes away a lot of time. Also the logistics in
having to get the equipment and deciding what to get (56).

Had to get people familiar with the new system. Had to
get them trained. A lot of problems were resolved before
hand by training (42).

USER NEEDS/HUMAN FACTORS

The interviewees were asked how were the user needs and human factors considered?

THE MAJORITY OPINION

Used a consultant and pilot locations. Was not consulted. Believed management did check the human factors (54).

Believed they were determined by the administrative personnel. It is the typical method to develop customer profiles and then after initial activation to begin system tayloring through software (48).

That was a task force responsibility. The task force is made up of users, sales personnel and administrative personnel. Membership in the task force is by the recommendation of field users (30).

Task forces have over the years studied the effects on personnel, it is now accepted by workers that NCR has considered the user's needs (46).

THE MINORITY OPINIONS

Minority Opinion #1
A massive training effort, also took care of office environment (ie..selected a low noise printer) (56).

Systems are user friendly, because the people are not computer oriented. The organization was fast to answer complaints when the system did not run right. People were available who understood what was happening (41).

The factors were considered, people were surveyed and interviewed as to what was wrong and what to change (ie..process performed after each change.)(27).

Minority Opinion #2
Don't think that they were, at least no real consideration, the equipment selected was pretty generic(8).

Minority Opinion #3
It varies from case to case, the system is phased in and not all are involved at the same time to the same degree. We were given a clear choice where in doubt, like, training was not mandatory because each individual has a different level of need (42).

LESSONS LEARNED

The interviewees were asked what would they do or like to be seen done different.

THE MAJORITY OPINION

There was no majority opinion.

THE MINORITY OPINIONS

Minority Opinion #1

Need to do more user involvement because we must make sure to throw in the niceties (8).

Should have contacted the daily users, and made changes afterward. Would like to see greater management responsiveness to criticism (54).

Need too make sure the applications are good and consider the user more or will tend to make the user overwork. It can create more work than alleviates (27).

Minority Opinion #2

Need more follow-up, initial training was good enough to get started but then was a case of do it yourself. The overall the change had to be desired, works the best where it is desired (48).

Would be hard to improve, the organization used good quality equipment, and first class software was developed. Training was of limited value because all can't be taught. (Users) Must be prepared to do on their own. The more dedicated learn faster, but everyone(users) needs some background before they(instructors) start trying to teach them (users) (30).

There were no real problems since most knew where to go to get them solved. However, training needs to be scheduled to be when most convenient. Training needs to be a higher priority (42).

Minority Opinion #3

Looked at too much on how it would help top management, not enough on how it would increase and improve the job. Also were not made fully aware of what all was going to happen (46).

Minority Opinion #4

Not enough time to plan, but still must be prepared to move forward, must know what you are trying to do. Need to plan to grow into an implementation (56).

Make sure applications are more user friendly because not everyone will be well versed. Need to let evolve a little more and prevent risking putting through too much too fast. Need to be a little comfortable (41).

Appendix B: Synopsis of the Bl SPO Interviews and Responses
              as Classified by Majority and Minority Opinions

        The following is a synopsis of the replies to the
informal interview questions. The responses have been sorted
by majority/minority opinions. The responses have been
edited so the intent of the entire response could be
conveyed.

        MEASURE OF SUCCESSFUL IMPLEMENTATION

        The interviewees were asked as to what they they
believed made an implementation effort successful.

                THE MAJORITY OPINION

        There was no majority opinion.

                THE MINORITY OPINIONS

Minority Opinion #1
        Something that would be accepted and used throughout
the organization, and specifically increase productivity and
be simple to use (50).

        If the end result were an increase in productivity and
a decrease in effort (55).

Minority Opinion #2
        If able to accomplish the job as easy as possible with
as little reference to the books as possible (22).

Minority Opinion #3
        Must be fast, have error checking capability, and
able to eliminate duplicates. A time saver and user :
with user oriented output (4).

        In the same amount of time, do the job fast :
it easier to find things (3).

Minority Opinion #4
        Commonality, the ability to use or comp
other systems. Standardization of the softwar
(19).

Minority Opinion #5
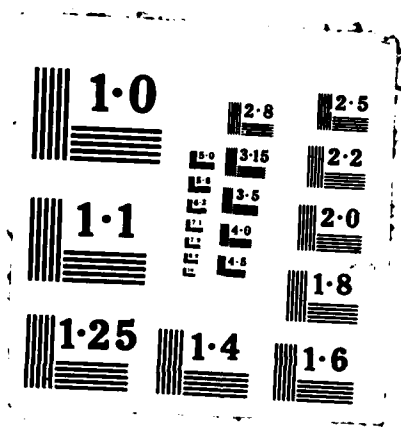   The one that satisfies the most
might use it. Does what is asked of

Minority Opinion #6
    Consistency in operation. Must be able to do the jobs
desired, must be quicker, efficient, and compatible. The AMS
tends to be very slow. Sometimes I think manual is faster
(53).

Minority Opinion #7
    Be able to automate documentation, reduce the labor and
paperwork and the amount of effort to update documentation
(31).

    MANAGEMENT ACTIONS

    The interviewees were asked what top management support
they received.

    THE MAJORITY OPINION

    I have not really seen pressure to get the computers.
They (upper management) do support but not actively. They
support the paperwork cycle, and let solutions evolve (55).

    I don't interface with management. No real effort seen,
but we get pretty much what we want (53).

    The Air Force ordered the computers that gives the SPO
standalone computing capability. People are scheduled as
they come in, but no real effort was seen, I know it has to
be up to someone (19).

    Must be supported because it expanded so fast. Also
everything we asked for gets put on order. Not seen any
direct efforts. No management continuity. Erractic (4).

    Not evident, but I am usually content with what gets
done (3).

    THE MINORITY OPINIONS

Minority Opinion #1
    The size of the corporate investment in equipment, also
all important information is directed to be sent by
electronic means. Downward pushed (50).

    A great deal of investment. Problems are addressed
faster due to upper level support (31).

Minority Opinion #2
     A one page survey was taken of the organization as to
the type of work done and what they (the supervisors) felt
were necessary (22).

Minority Opinion #3
     They come up with the ideas and recommendations,
assigned the projects and gave the requirements for
tracking. Put ideas in terms of capabilities (57).

INFORMATION SYSTEMS PLANNING

     The interviewees were asked what information system
planning was done.

THE MAJORITY OPINION

Not involved or have not seen it (55).

None really seen. There was no plan to follow (57).

None seen (3).

THE MINORITY OPINION

Minority Opinion #1
     It (the plan) grew-up or evolved, decreed from a
functional standpoint, uniqueness of the system used is due
to separate government buys preventing standardization.
Essentially no coordinated plan (50).

Minority Opinion #2
     The contractor has done some development. They tried to
identify updates. I was involved in the system requirement
review meeting to establish requirements to the contractor
(31).

Minority Opinion #3
     I am sure there was, but someone else is doing it
because we got what we asked for (53).

     Have not seen much, did see some surveys for the Z-100
and Z-248. We got what we asked for in the survey (4).

Minority Opinion #4
     We sent requirements to B-1P, the request was matched
to the allotments and then the greatest needs were decided
(22).

Put in a request form. Based the request on our own workload and type of operations (19).

PROBLEMS

The interviewees were asked as to what problems have been encountered in the implementation.

THE MAJORITY OPINION

The AMS is too slow, believe a personal computer is better. Software is easier to use. There are too many users, it makes the manual operation quicker. The secretaries express feeling they think they are worth more if they learn to use a computer. The system is also too hard to use (55).

Speed problems in the AMS and reliability interface problems. Response is prompt to problems, our people get right to it (53).

Speed of the system. Amount of space on the mainframe is too limited. Access to the printers is too hard because not every terminal has access to the desired printer (19).

Slowness, no error detection, and it is not easy to edit data but, it is too easy to enter mistakes. Also the system is awkward to use (4).

Because it is a slow system it is not as powerful as (I) would like it to be. Prefer more sophistication. (I) Have to go through a lot to get a print out (3).

THE MINORITY OPINIONS

Minority Opinion #1
Printers are broken to often and fixed too much. Because of the waiting time for delivery, the training is done when no hardware is available (22).

Minority Opinion #2
No champion, organizational resistance from older users, some cultural trauma. The organizational support is for the traditional A.F. forms and not computer generated forms. The current system is overloaded and slow (50).

Minority Opinion #3
    Uncommon databases, we do not want to use them because users become antagonistic to computers. Also there are too many uneducated users (57).

Minority Opinion #4
    The same problems keep coming up. Should not accept a system that has bugs. Bugs are too common (31).

USER NEEDS AND HUMAN FACTORS

The interviewees were asked how were the user needs and human factors considered?

THE MAJORITY OPINION

There was some training and all the manuals are available. Support is rapid, everything gets taken care of (53).

The system is awkward to use, when combined with its slowness. Takes AMS to long to initialize. Training is adequate, also the people who are available can always get an answer. (We) Did not not have training at the same time as the implementation (4).

The responsible office is very accessible. Also the ongoing training is not on a regular schedule, it is set up as needed. Good attendance (57).

Offer training and can get a hold of some one if a problem comes up (3).

THE MINORITY OPINION

Minority Opinion #1
    Good training made available, also slowly getting more modular furniture as requests are made. Only ordered if required. Evolution and no real overt effort (50).

Minority Opinion #2
    Do not know that they were because I have not seen any correspondence or a formalized effort. Must have had some planning (55).

Minority Opinion #3
    Determined or considered the type of terminal based on capability and personal preference. The training was set-up beforehand (22).

Each directorate determines who needed it then it was placed for the most convenient use. The in-house training was done or offered as well as A.F. training. But they were not mandatory (19).

Minority Opinion #4
Better user manuals. Have not had an official training in the past, now it is available (31).

LESSONS LEARNED

The interviewees were asked what would they do or like to be seen done different.

THE MAJORITY OPINION

Consider software at the on-set, should plan for a common system and a relational database. Would like greater accessibility, (we) must be able to work internally and externally (50).

Plan for common databases. I would like to talk to someone at the end of a SPO effort and find out what they needed and recommend (57).

A database to consolidate work and reduce size of effort. Establish commonality. Could be more efficient or friendly (53).

THE MINORITY OPINIONS

Minority Opinion #1
Like to see refresher training because it was done to far in advance. Not many complaints. But I would select a better printer (22).

Minority Opinion #2
Plan needed for standardization, allow for a system that is easier to use by non-computer types (55).

Minority Opinion #3
Don't have the funds, cannot afford all we need. I would have done more research or seen what the other SPO's are doing or maybe even a pilot site. I would have had a larger MIS office. We have too much dependence on people who leave (19).

Minority Opinion #4
     So far the cost is not worth the result. We need to
improve response time. Too much dependency on others (4).

Minority Opinion #5
     Prefer a different contractor, they don't have not
enough incentive to get the job done right. There are other
SPO's involved in same effort if we get together we can have
better testing, and more incentives to do the job better
(31).

Minority Opinion #6
     (I) Would like a faster system and more wordprocessing
power. Also (I) would like a printer that is easier too use.
But, I am pretty much satisfied with what it currently does
(3).

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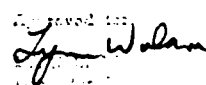
Permanent address: 438 Rollingwood Circle

Fayetteville, North Carolina 28305

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited.		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE				
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GIR/LSQ/87D-8		5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics	6b. OFFICE SYMBOL (If applicable) AFIT/LSQ	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB OH 45433-6583		7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS		

		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
IMPLEMENTING INFORMATION SYSTEMS/OFFICE AUTOMATION IN AN AIR FORCE ENVIRONMENT

12. PERSONAL AUTHOR(S)
Wilburn Walter Smith, Captain, USAF

13a. TYPE OF REPORT MS Thesis	13b. TIME COVERED FROM_____ TO_____	14. DATE OF REPORT (Year, Month, Day) 1987 December	15. PAGE COUNT 109

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Information Systems Office Personnel
05	01		Man Machine Systems Automation
05	02		Information Retrieval Air Force

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

THESIS ADVISOR: Richard E. Peschke, Lt Col, USAF
Assist Prof of Logistics Mgt

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Lt Col Richard Peschke, Lt Col, USAF	22b. TELEPHONE (Include Area Code) (513) 255-6280	22c. OFFICE SYMBOL AFIT/LSQ

DD Form 1473, JUN 86   *Previous editions are obsolete.*   SECURITY CLASSIFICATION OF THIS PAGE

Abstract

The objective of this research was to identify, through case study and literature review, guidelines that have been developed and successfully demonstrated in civilian and/or government organizations, through which a foundation can be laid to effectively implement information systems in an Air Force office environment. In particular, how well do these guidelines apply to the office automation efforts of the existing office in the B-1B System Program Office (SPO)?

To accomplish this research, interviews were conducted at the National Cash Register Corporation and the B-1B SPO then grouped by the degree of consensus obtainable. Specifically, the opinions expressed were classified as majority or minority opinions. Next, this study compared the opinions expressed to determine what differences existed between the two implementations and how these differences accounted for their relative degree of success.

Based on the comparison of the two implementations there were five findings that were determined to be consistent in identifying a successful implementation and could be used to develop effective policies and guidelines. The five findings to the research were: 1) a set of well-defined goals and organizationally accepted success criteria are consistent with successful IS/OA implementation; 2) a highly visible top management is a strong ingredient in a successful IS/OA implementation; 3) the research supports the necessity of establishing a well-regulated and publicized planning process; 4) there appears to be little difference between the commercial implementation and the government implementation; 5) the consideration of user needs and satisfaction acts as a synergistic value to a successful IS/OA effort.

This study achieved three important goals. First, the research provides the basic framework necessary to begin the development of a coherent policy for future IS/OA implementations. Second, the information reinforced the need to establish an orderly process by which the success of an IS/OA can be determined. Finally, the study has shown that there are tools and methodologies available that can be used to help determine how to implement an IS/OA to benefit the Air Force.

END

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MARCH, 1988

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